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PARTICLEBOARD

INSULATION BOARD and HARDBOARD

Industry Trends, 1956-66

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• PARTICLEBOARD
• INSULATION BOARD
• and HARDBOARD

Industry Trends, 1956-66

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PREFACE

This report describes national and regional trends in number, capacity, production, and capacity utilization of particleboard, hardboard, and wood-base insulation board mills in the United States from 1956 to 1966. Use of raw materials has been estimated for the particleboard industry and for the combined hardboard and insulation board industries. In the appendix are various tables, including lists of plants producing particleboard, hardboard, and insulation board as of January 1, 1966, together with their location, annual capacity, and type of raw material used. Not included in this report are plants making insulating boards from other than lignocellulosic fibers.

The information presented was gathered from a wide variety of sources. Most important were Forest Products Laboratory and other Forest Service records, Bureau of the Census publications, annual editions of the "Directory of the Forest Products Industry" and "Lockwood's Directory of the Paper and Allied Trades," and trade magazine articles. The helpful information provided by the National Particleboard Association, the Insulation Board Institute, and the American Hardboard Association is greatly appreciated.

Every effort was made to include all plants in the United States that make particleboard, hardboard, and wood-base insulation board, and to provide correct and complete information. When data from different sources seemed to conflict, individual plants were contacted. In years for which data are not available, estimates were based on the best information at hand.

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INTRODUCTION

Output of particleboard, insulation board, and hardboard has increased substantially during the past 10 years. From 1956 to 1966 the number of plants making these products nearly doubled, and capacity grew over 200 percent. The increase in particleboard production has been spectacular—over eight times during this period, nearly 24 percent a year.

Plants making particleboard increased more rapidly in number and in capacity than plants making insulation board and hardboard. Since January 1, 1956, the number of particleboard plants has increased from 25 to 58, and capacity nearly eight times to over 1.1 billion square feet a year as of January 1, 1966. More plants were scheduled to come into production during 1966 and 1967.

Plants making products ranging from lightweight insulation board to heavier-than-wood hardboard increased in number from 26 to 40 between 1956 and 1966. Their combined capacities climbed 64 percent from about 2 million tons to 3.3 million tons per year.

Data on new capacity does not adequately indicate the actual amount of investment in the particleboard, hardboard, and insulation board industries in recent years. Major expenditures have been made in cut-up, finishing, and overlaying equipment which enables plants to process their output into more profitable specialty and consumer products.

Estimated use of wood raw material in all three industries increased from less than 135 million cubic feet of roundwood equivalent in 1956 to about 236 million cubic feet in 1965. About three-fourths of the material used is residues from other forest industries. The proportion of raw materials coming from agricultural byproducts, such as bagasse fiber from sugar processing, has declined.

THE PARTICLEBOARD INDUSTRY

Particleboard, which was first produced commercially in the United States in 1945, is made from wood particles bonded by synthetic resin adhesive under heat and pressure.

In recent years a wide variety of these boards has been developed. There are several methods of manufacture and many types of resin adhesives. There is a broad selection of thicknesses. Control of particle size and of particle distribution through the board makes possible production of boards with a wide range of surface properties. Many boards are now designed to have properties suited for specific uses.

Particleboard Plants Increase From 25 to 58

At the beginning of 1966, 58 plants in the United States were producing particleboard—26 in the South, 21 in the West and 11 in the North (fig. 1, table 1,[1] and map page 2). Recent expansion has been concentrated in two periods—1956 to 1958 and from 1963 to the present. In the first period 29 new plants were built, largely in the South and West (fig. 2). Following this spurt of rapid growth were 5 years in which the number of plants going out of production nearly equaled the number constructed.

In the last 3 years there has been another boom in particleboard plant construction. Ten plants

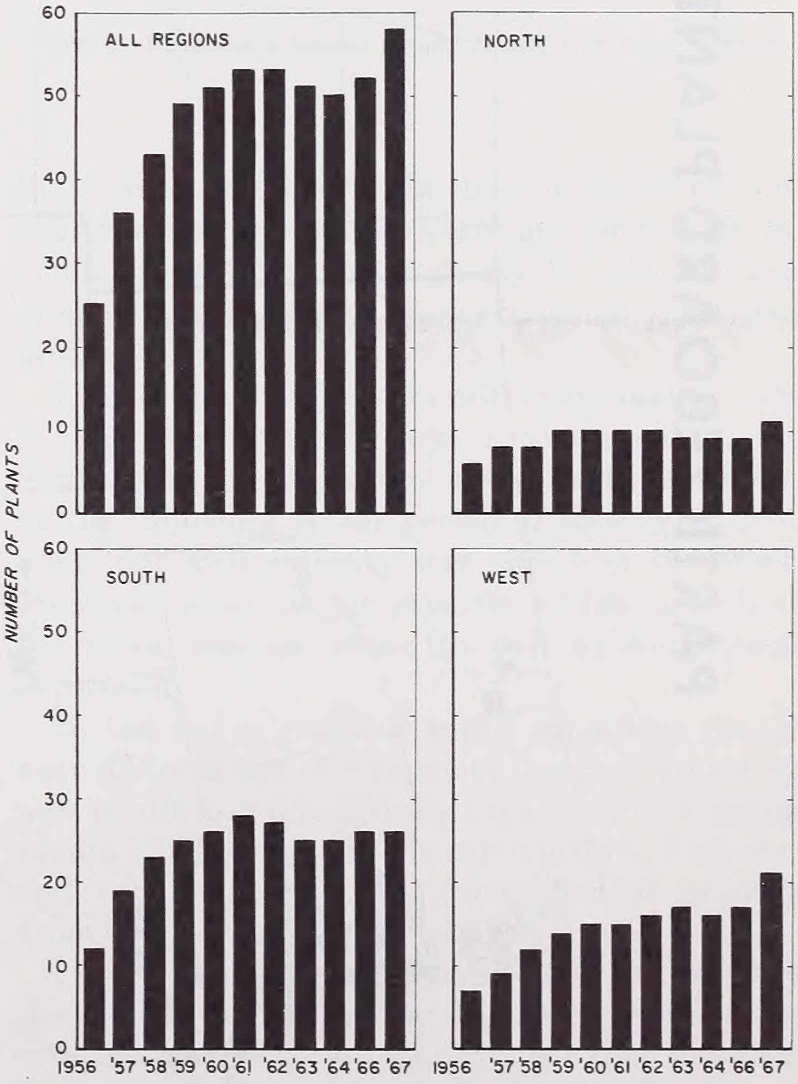

Figure 1.—Plants producing particleboard January 1, by region, 1956–66.

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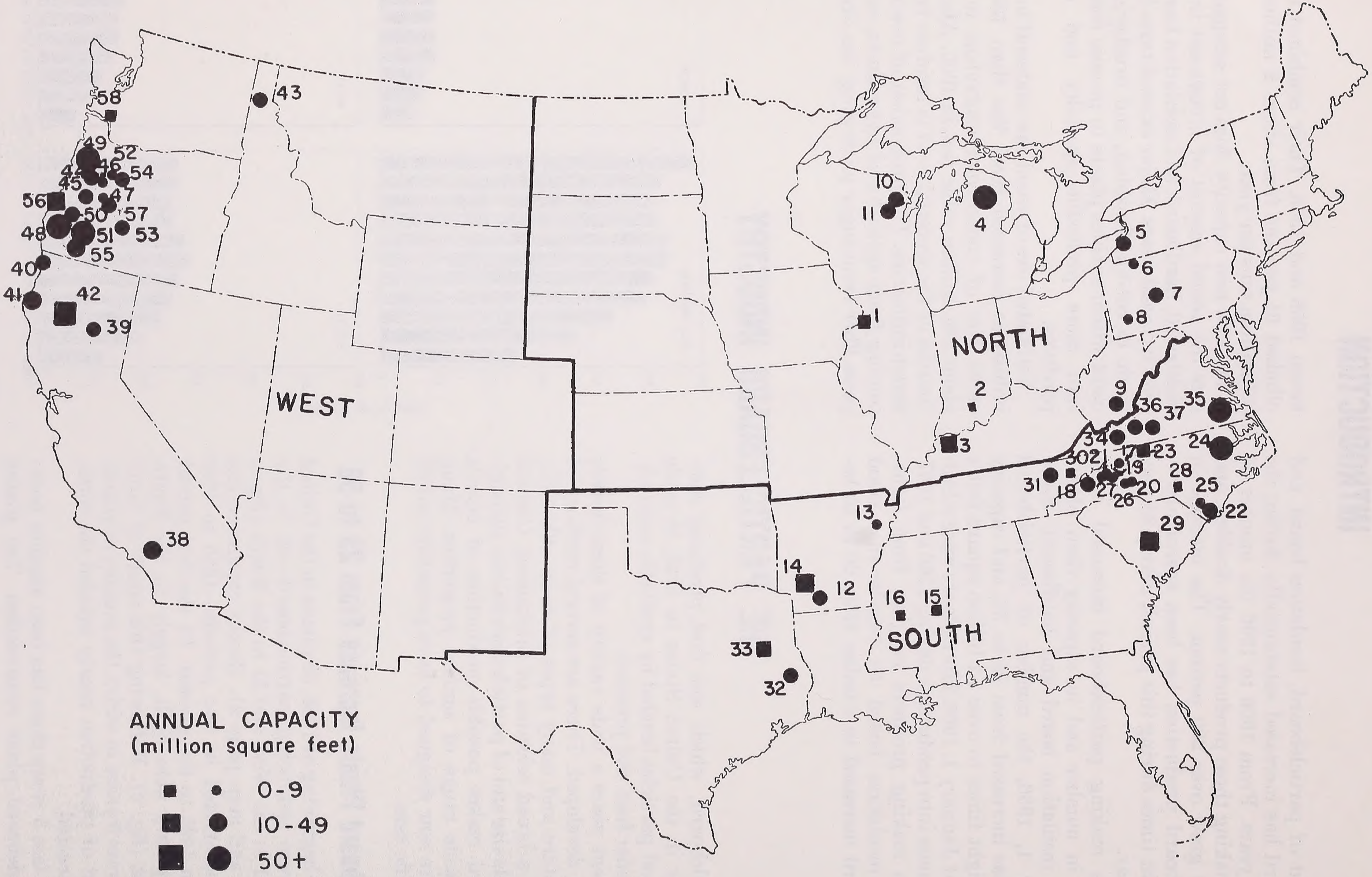
[1] All tables in appendix.

PARTICLEBOARD PLANTS IN THE UNITED STATES



Squares denote plants operating in 1955.
Circles denote plants starting operations after 1955.

NOTE:
Number for each plant corresponds to number in Appendix Table 6

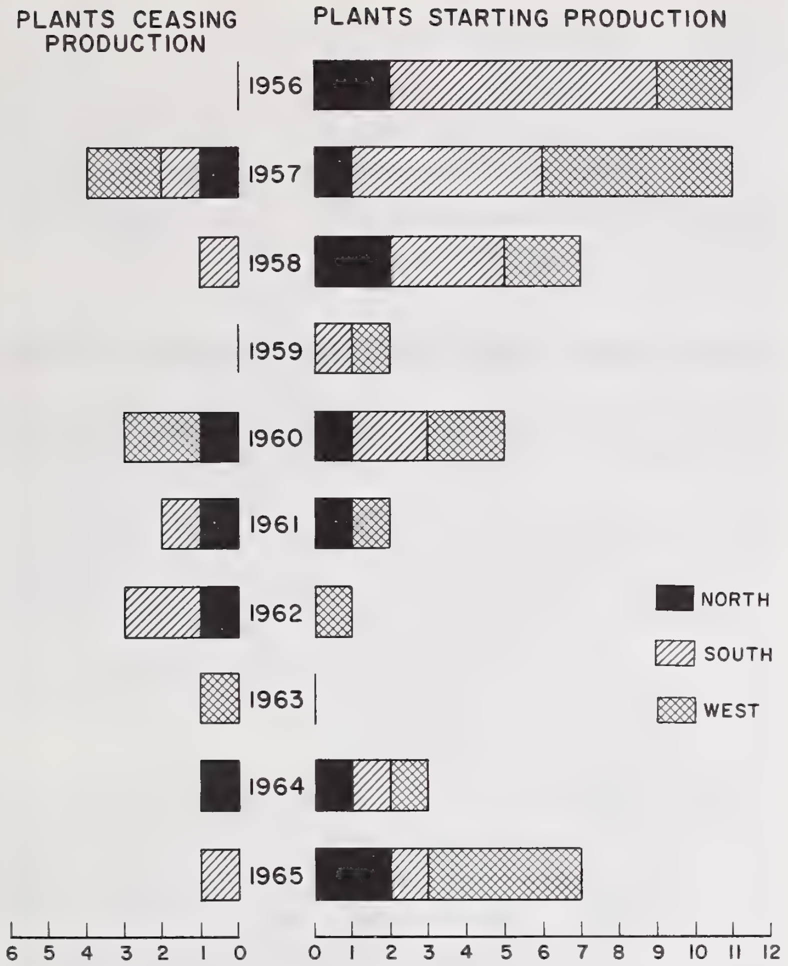


Figure 2.—Number of particleboard plants starting or permanently stopping production, by region, 1956–65.

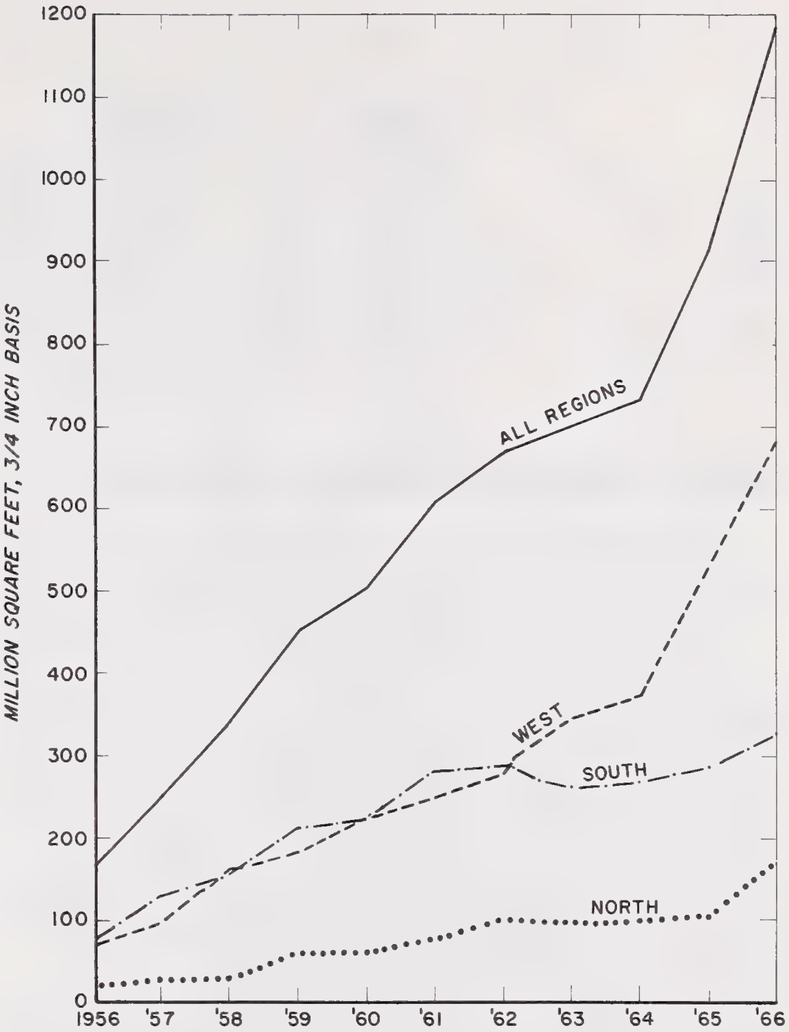


Figure 3.—Particleboard industry capacity January 1, by region, 1956–66.

were added in 1964 and 1965. At last count, 13 more plants were either expected to come into operation in 1966, were being constructed, or were in active planning stages (see table 8).

The number of plants starting and those going out of production each year are shown in figure 2. In 1965, seven plants began operations (four in the South), and one shut down. The distribution of plants among regions in 1956 and 1966, as of January 1, was:

	1956		*1966*	
	Number	*Percent*	*Number*	*Percent*
North	6	24	11	19
South	12	48	26	45
West	7	28	21	36
United States	25	100	58	100

Capacity Is Being Added Largely in New Mills

Particleboard mill capacity (traditionally the amount of panel ¾-inch thick that can be produced with continuous shifts in 300 operating days) rose over 1 billion square feet between 1956 and 1966 (fig. 3, table 2). Capacity increased nearly 10 times in the West, and over eight times in the North and four times in the South. Three-quarters of the increase in particleboard capacity in 1956–65 came from new mills, the rest from expansion of existing mills.

During the first boom in mill construction, 1956 to 1958, new capacity was concentrated in the South, with lesser amounts in the North and West. In the following 5-year period of slow expansion, most new mill capacity was added in the West. However, much of the capacity added in each of the three regions came through existing plant expansion.

In the last 3 years of rapid expansion nearly four-fifths of the new capacity has been added by new plants and one-fifth by expansion of existing plants. Contributing to the rapid growth were several very large new western mills that produce from 60 to 100 million square feet a year.

Until 1962, capacity in the South was roughly the same as in the West and growing at the same rate. Most of the new capacity since then has been in the West, though capacity in the South and North also increased. The distribution of capacity by regions at the beginning of 1956 and 1966 was:

	1956		*1966*	
	Capacity (million sq. ft.; ¾ inch)	*Percent*	*Capacity (million sq. ft.; ¾ inch)*	*Percent*
North	19	11	168	14
South	75	46	326	28
West	70	43	689	58
United States	164	100	1, 183	100

Plants Coming Into Production Are Large

Average capacity of plants that have started production since the beginning of 1956 is nearly 17 million square feet per year. In the first surge of expansion, average size of new plants was 10 million square feet a year (fig. 4), only slightly larger than existing producers. From 1959 through 1963, the capacity of a typical new plant was 20 million square feet. From 1964 to 1966, the average annual capacity rose to over 40 million square feet. The average capacity of all operating plants more than tripled from 1956 to 1966.

Plants going out of production have generally been small. Average size of the 16 discontinued plants was 6 million feet and many made less than 2 million feet a year.

Plants in the West have consistently been much larger than those in the North or South. In 1966, average capacity of western plants was 33 million square feet a year, compared to 15 million in the North, and 13 million in the South.

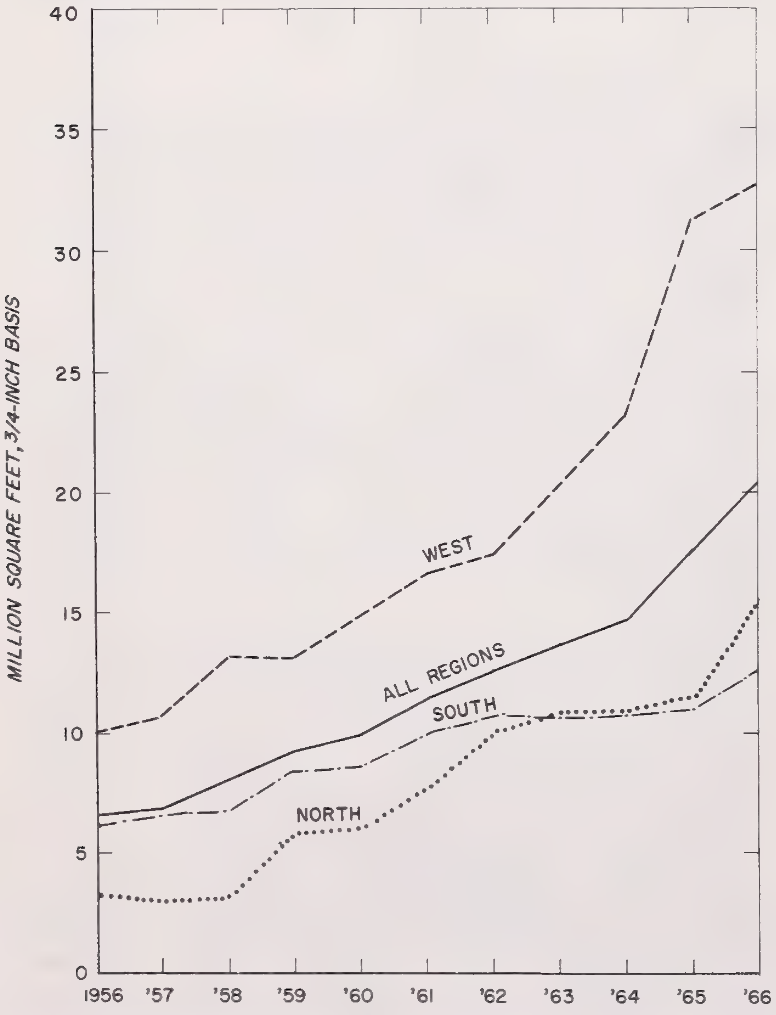


Figure 4.—Average particleboard plant capacity January 1 by region, 1956–66.

Platen Board Plants Outstrip Extrusion Plants

Only 14 particleboard plants now use the extrusion process, where the particle-resin mixture is forced by pressure through a die formed by rigidly mounted platens to form panels. Only one extrusion plant has been built since 1956. Extruded board is principally used as a furniture core material to be faced with veneer, plastic, or other material. Ten of the mills are captive plants owned by furniture firms.

The platen process, where the resin-coated particles are formed into mats and pressed into panels in a heated press, is now used exclusively in new plants. Platen-formed panels are generally adaptable to a wider variety of end uses than are extruded panels. Their manufacturing process also lends itself more readily to production of special grades and densities and to more rigid quality controls.

In recent years an increased number of plants have been selling cut-to-size pieces and partly manufactured parts. In 1965, at least 37 plants had cutup facilities and 24 of these shipped only cut-to-size products.

Most Particleboard Now Sold on Open Market

In 1956, 15 percent of capacity was in captive plants which furnished particleboard only for further manufacturing in other plants of the same firm. Plants with 21 percent of total capacity were partly captive, selling on the open market only what was not shipped to other plants in the same firm. All other plants (64 percent of total capacity) sold their entire production on the open market. By January 1966, capacity of captive plants had declined to 5 percent and partially captive plants to 17 percent of the industry, leaving 78 percent to sell on the open market.

Sharply Climbing Demand Spurs Industry

In response to rapidly rising demand for particleboard, particularly for use as furniture core material and underlayment in construction, production increased over eight times between 1956 and 1966 (fig. 5). This is an average increase of nearly 24 percent a year.

Imports were negligible before 1962 and less than 1 percent of total consumption in 1965. No appreciable amounts of particleboard have been exported.

Production in 1966 was estimated to be 950 million square feet. Per capita consumption increased seven times—from 0.7 square feet per year in 1956 to about 4.8 in 1966.

The change in distribution of production by region between 1957 and 1964 (the first and most recent years Bureau of the Census data are available) is:

	1957		*1964*	
	Production (million sq. ft., ¾ inch)	*Percent*	*Production (million sq. ft., ¾ inch)*	*Percent*
North	16	8	45	7
South	69	37	236	37
West	102	55	357	56
United States	187	100	638	100

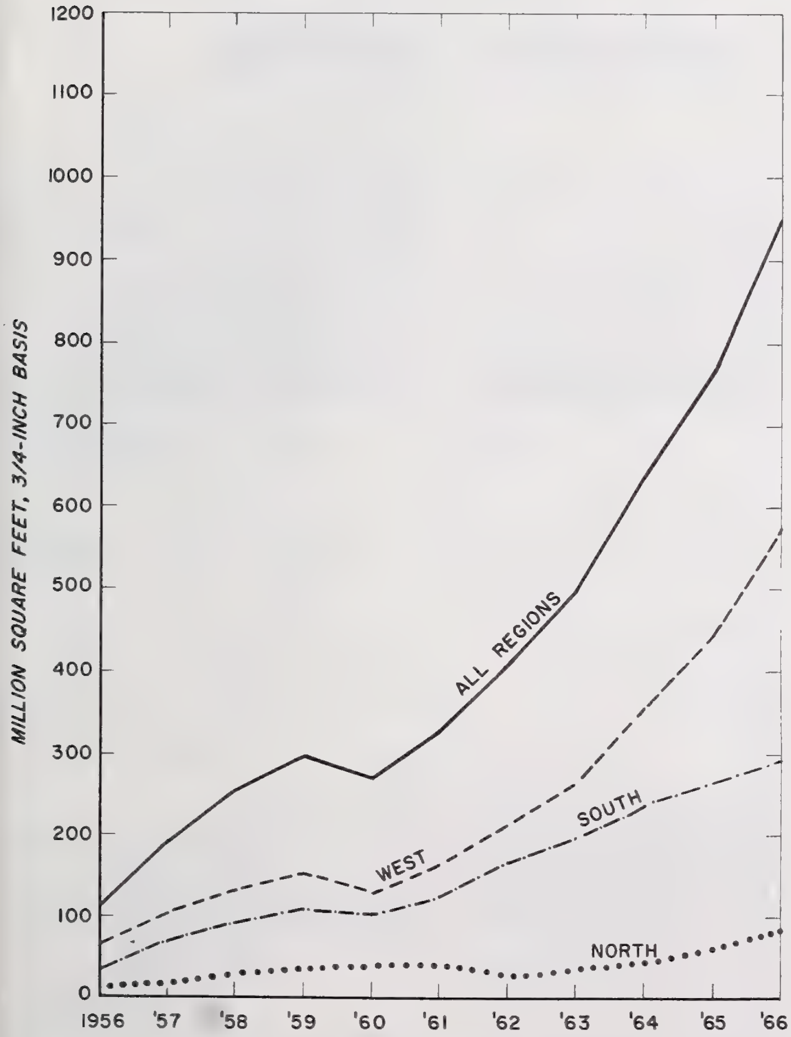


Figure 5.—Particleboard industry production, by region, 1956–66.

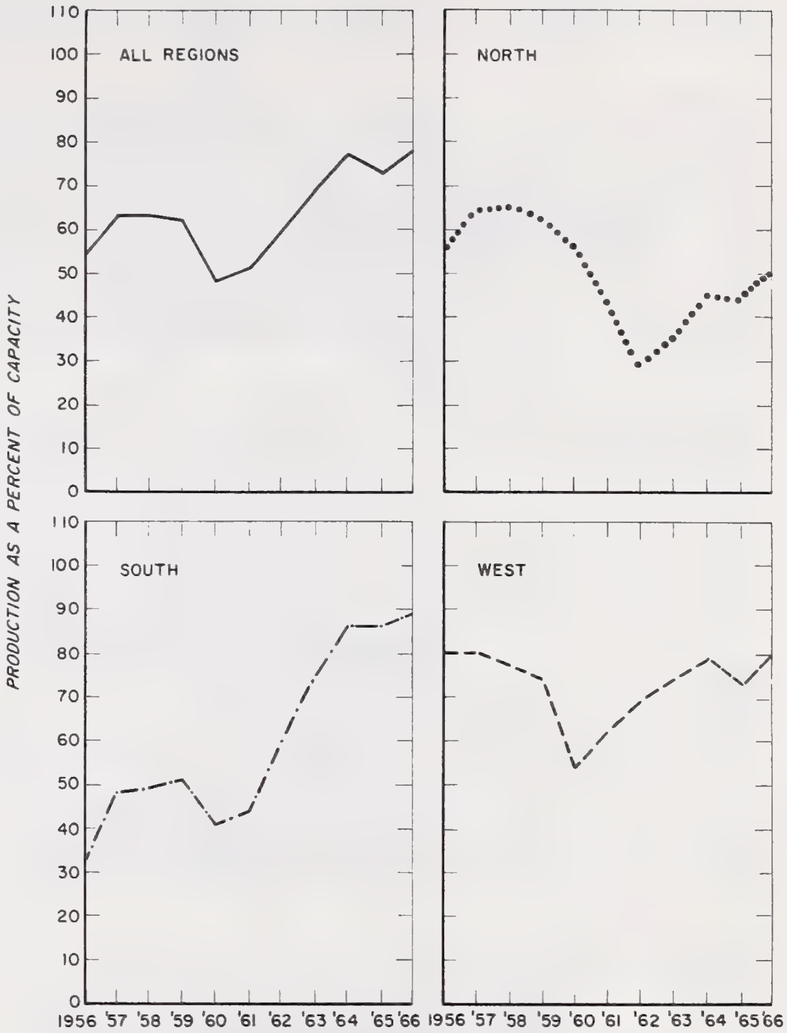


Figure 6.—Utilization of capacity of the particleboard industry, by region, 1956–66.

Utilization of Capacity Increases Rapidly

Production has increased more rapidly than industry capacity in recent years. Until 1961, output was between 48 and 63 percent of the designed mill capacity at the beginning of the year (fig. 6). Since 1963, production has been above 70 percent of capacity, except in the North where it is about 50 percent.

Rates of capacity usage in the particleboard industry are lower than for many other industries because particleboard capacity estimates generally assume continuous three-shift operation. Many plants in the industry normally operate only one or two shifts.

The large excess of capacity in the 1959–61 period was evidently a primary cause for the slower rate of expansion during this period. Recent improvement in utilizing plant capacity has apparently aroused renewed interest in construction of new plants and expansion of existing ones.

Use of Residues and Inplant Waste Increasing

Except for two plants in the North, new plants built since 1961 use residues of other forest product industries. Since such residues are more easily broken into small particles than cut into flakes, the share of flake-type board in the industry's output has declined. Production of layered board, with fine particles near the surface and coarse material in the center, has increased.

Most particleboard makers have sought to reduce losses of wood in manufacturing operations. Much of the fine wood material formerly screened out and destroyed is now used. Reuse of the plant's own residues from trimming and defective panels has become common. A number of plants also use sander dust from particleboard surface finishing operations. Reuse of waste and dust means saving 10 to 16 percent of wood raw materials.

It is estimated that approximately 80 cubic feet of solid wood (or the equivalent amount of residues) of all species except aspen and other light woods is required to produce 1,000 square feet of particleboard ¾-inch thick. The assumptions this factor is based on are given in the appendix.

Raw Material Use Up Nearly Six Times

Estimated use of wood raw material for particleboard production increased from 9 million cubic feet in 1956 to 52 million cubic feet of solid wood equivalent in 1964. About 83 percent is now residues, and only 17 percent roundwood. Softwoods comprise 87 percent of the residues but only a negligible part of the roundwood. The 52 million cubic feet of wood is equivalent to 670,000 cords.

The estimated cubic foot volume of raw material used by region in 1964 was:

[Million cubic feet]

	Softwood residues	*Hardwood residues*	*Hardwood roundwood*	*Total*
North	0.5	0.4	3.7	4.6
South	8.6	5.0	5.4	19.0
West	28.4	.2	------	28.6
United States	37.5	5.6	9.1	52.2

THE INSULATION BOARD AND HARDBOARD INDUSTRIES

The wide range of products made by forming refined or partially refined lignocellulosic fibers into large sheets or panels has recently been reclassified into two general types—insulation board and hardboard. Formerly, an additional type—medium density fiberboard—was recognized. Its density range fell between that of insulation board and hardboard.

Under the new definitions, insulation board ranges in density from 10 to 31 pounds per cubic foot. The boards are generally formed on special cylinder- or Fourdrinier-type machines and fed into large multiple deck dryers. Much of the strength of the board comes from the integral bond produced by the interfelting of the fibers from which it is produced. In addition, certain materials such as starch, rosin, or asphalt may be added to improve the internal fiber bond, water resistance, or surface qualities of the board.

Practically all insulation board produced is used for building construction in a variety of product forms. Sheathing is most important, followed by roof insulation and ceiling and acoustical tile.

Hardboard's density is 31 pounds or greater per cubic foot. Unlike the process for insulation board, in hardboard manufacture the fiber mat is compressed using high pressures and temperatures in a hydraulic press. In addition to the type of internal bonding that occurs in insulation board, the pressure, heat, and moisture causes a softening of the lignin and a natural ligneous bond occurs. Various chemicals may be added during manufacture to impart desired board properties. Roughly half of the hardboard produced is tempered by treating with oils and resins and baking. Tempering increases board density, strength, stiffness, surface hardness, and water resistance.

About one-half of the hardboard consumed goes into various industrial uses such as furniture manufacture, mobile home manufacture, and the manufacture of doors and cabinets. Much of the remainder is used for various construction purposes such as floor underlayment, house siding, and interior decorative paneling.

Though wood-base insulation board and hardboard are distinct products with separate end uses, the raw materials used and the basic fiber preparation and mat-forming processes are similar. In January 1966, six plants were equipped to produce both insulation board and hardboard. For this report these mills were classified as hardboard or insulation board plants, on the basis of primary product produced as shown in the literature. Their capacity is listed for this primary product. It has not been possible to ascertain capacity for each product separately.

Regional production data for most of the last 10 years are available only for insulation board and hardboard combined. Thus it has not been possible to analyze regional capacity, production, and capacity utilization for insulation board and hardboard separately.

Number of Insulation Board and Hardboard Plants Up 50 Percent in 10 years

Between the beginning of 1956 and 1966 the number of plants producing wood-base insulation board or hardboard increased from 26 to 40 (fig. 7, table 3, and map on p. 8). Eight of these new plants produce primarily hardboard, and 6 produce mostly insulation board. But recent trends toward producing both hardboard and insulation board in the same installation has made many plants difficult to classify.

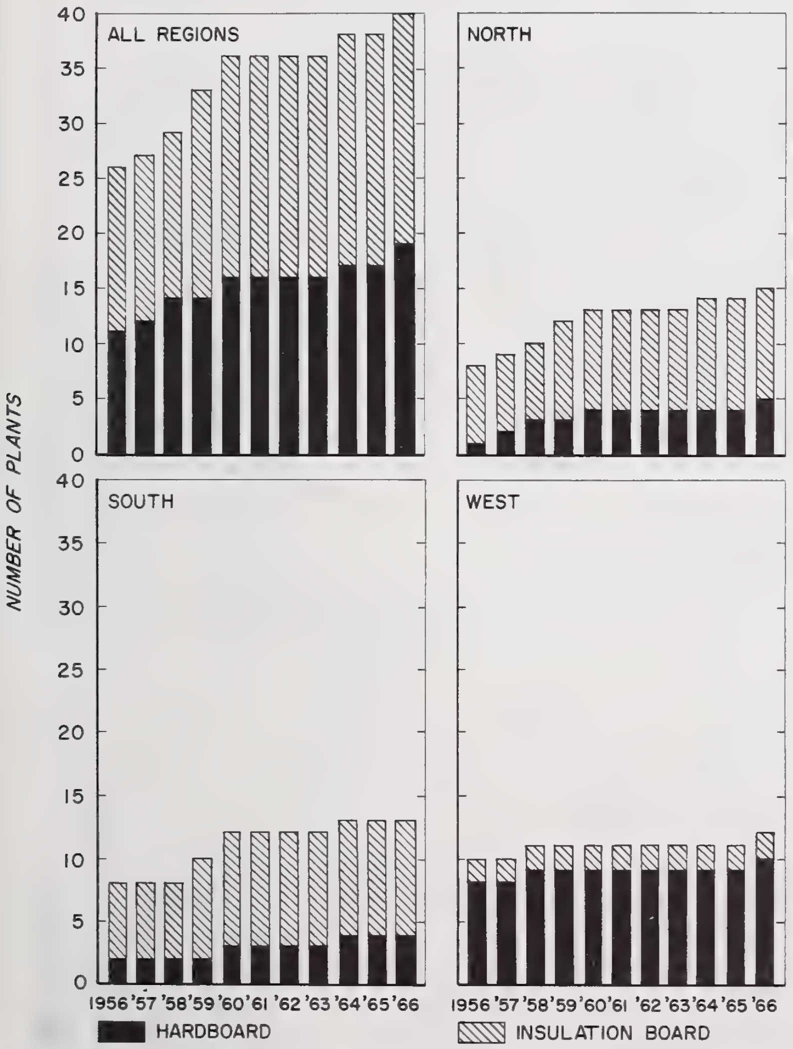


Figure 7.—Plants producing insulation board and hardboard January 1, by principal product and region, 1956–66.

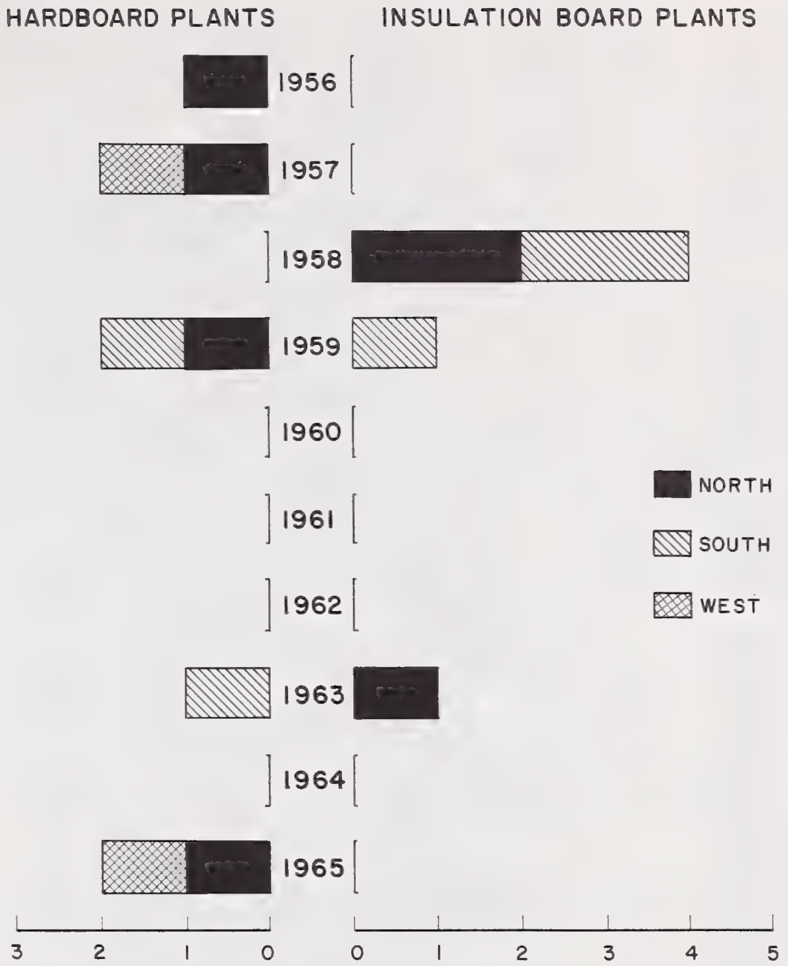


Figure 8.—Number of insulation board and hardboard plants starting production, by principal product and region, 1956–66.

As with particleboard, there have been two periods of rapid plant construction. Ten plants were built from 1956 through 1959 (fig. 8).

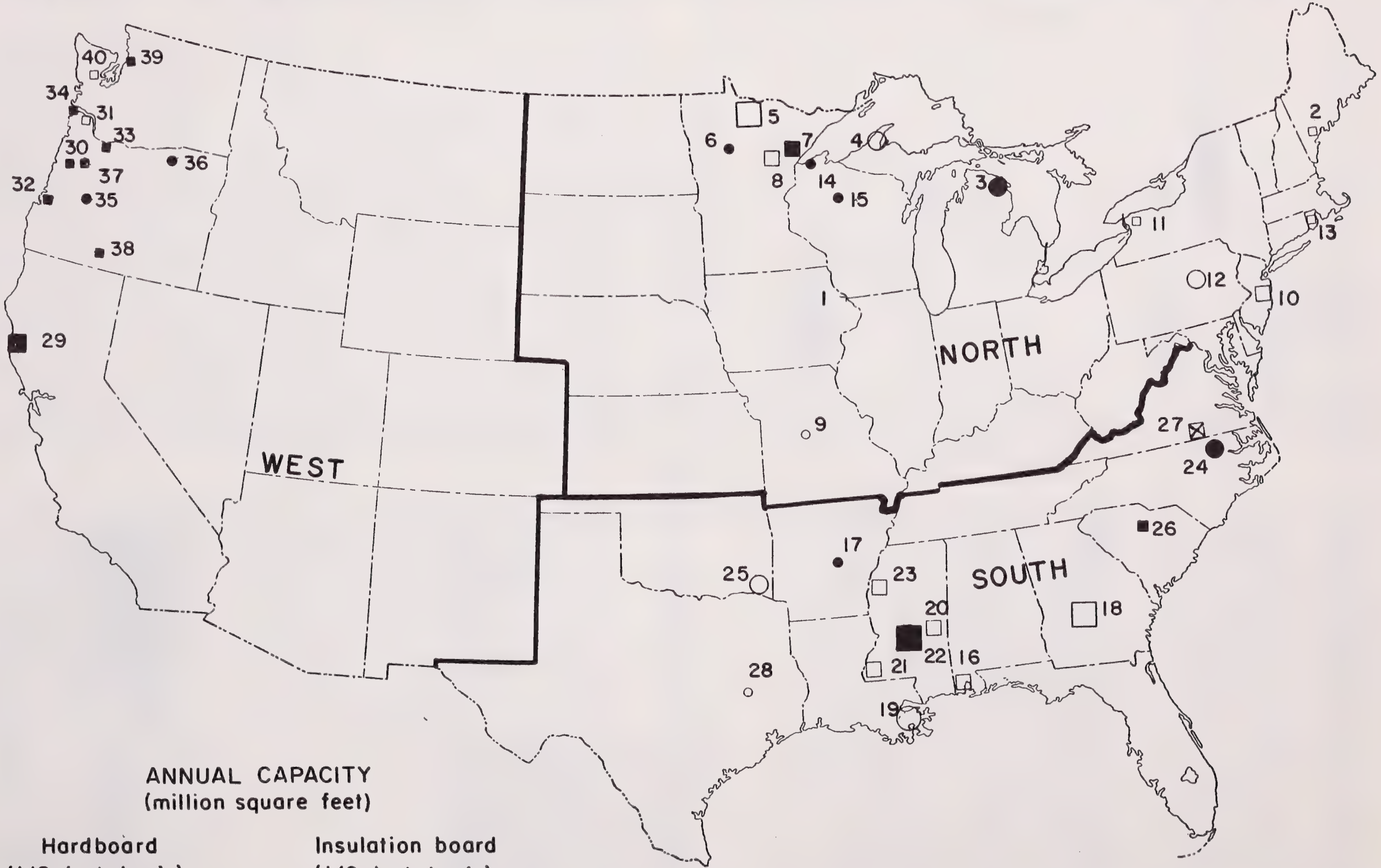
In the last 4 years, another four plants were built. At the end of 1966, five more plants producing mainly hardboard, and one plant producing mainly insulation board were in various stages of operation, construction, or planning (see table 8).

Since 1955, two hardboard mills have been built in the West, four in the North and two in the South. Only six insulation board plants have been built since 1955; three in the North and three in the South, and all but one were built in 1958–59. At the present, 10 of the 12 plants in the West make hardboard, but most of the plants in the North and South make insulation board.

Combined Capacities Up 1.25 Million Tons

The combined capacity for all hardboard and insulation board mills increased 64 percent from 1956 to 1966 (fig. 9, table 4). The percentage of the combined capacity did not change appreciably between regions. Capacity for both products is usu-

INSULATION BOARD AND HARDBOARD PLANTS IN THE UNITED STATES



ANNUAL CAPACITY
(million square feet)

Hardboard (1/8-inch basis)		Insulation board (1/2-inch basis)	
■ ●	0-199	□ ○	0-199
■ ●	200-499	□ ○	200-499
■ ●	500+	□ ○	500+

Squares denote plants operating in 1955. Circles denote plants starting operations after 1955.

☒ Capacity unknown

NOTE:
Number for each plant corresponds to number in Appendix Table 7

[Thousand tons per year]

	Combined capacity		*Insulation board capacity*		*Hardboard capacity*	
	1956	1966	1956	1966	1956	1966
North	664	1, 074	618	813	46	261
South	1, 051	1, 699	672	1, 142	379	557
West	315	555	96	105	219	450
United States	2, 030	3, 328	1, 386	2, 060	644	1, 268

ally measured in tons per day or tons per year of 330 operating days. Hardboard capacity is also stated in square feet of ⅛-inch board per year, and insulation board in square feet of ½-inch board.

The above tabulation shows combined regional capacity for 1956 and 1966 broken down between those producing insulation board and those making hardboard as their primary product.

In mills that produce mostly insulation board, capacity increased from nearly 1.4 to 2.1 million tons per year or 49 percent. Throughout the period, the South has had the largest share of the facilities. In 1956, three large southern plants had one-fourth of the U.S. insulation board capacity. And over two-thirds of the increase of capacity was built in the region. Most of the remaining increase in capacity occurred in the North, primarily in established mills. Growth in the West was small.

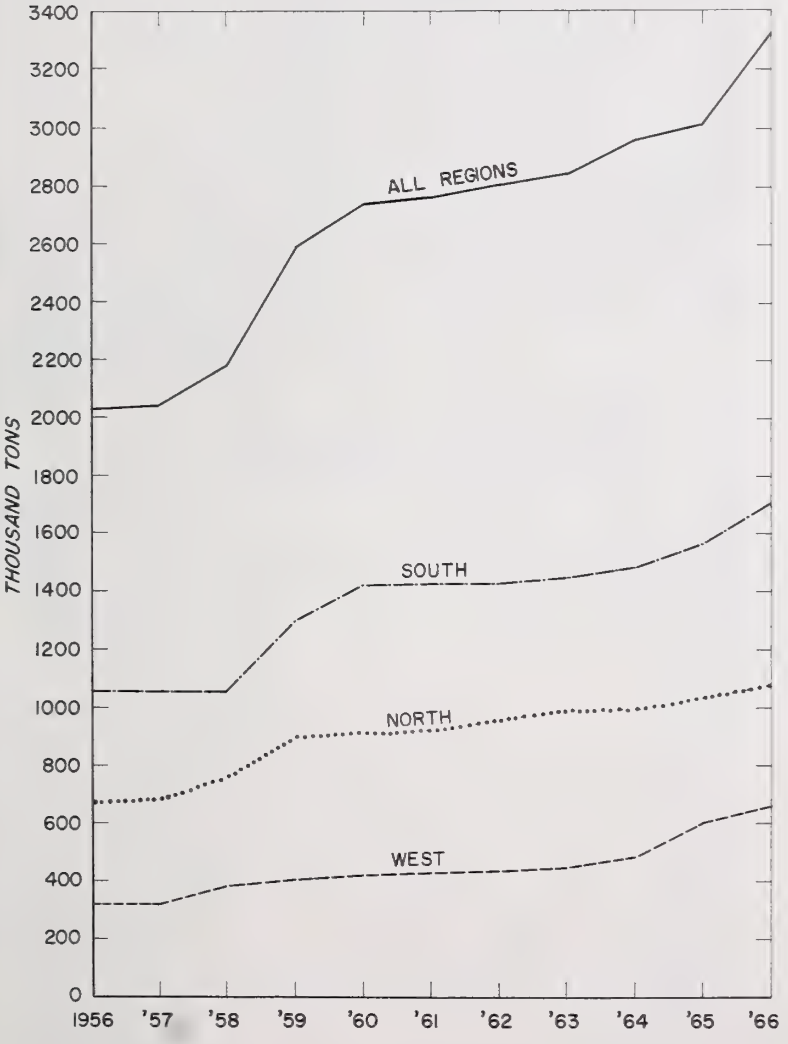


Figure 9.—Combined insulation board and hardboard industries capacity January 1, by region, 1956–66.

Hardboard capacity doubled between 1956 and 1966, from 644 to 1,268 tons per year. In 1956, nearly 60 percent of the facilities were in the South, primarily at the Masonite plant in Laurel, Miss. But in the 10-year period, expansion was almost equally divided between the regions. Consequently, the share of capacity increased very rapidly in the North and declined in the South.

Half the Capacity Growth Is in New Plants

Since 1956, only 55 percent of the growth in the insulation board and hardboard industries' capacity has been in new plants. The remainder has been additions of equipment and facilities in existing plants. In the insulation board industry, 64 percent of added capacity occurred in new plants, compared to 45 percent in the hardboard industry.

Though some additions have been built every year since 1957, investment in new plants has been concentrated in the years 1956–59 and 1963–66. Expansion of existing plants in both the hardboard and insulation board industries has been greatest in the South, where the bulk of the 1956 capacity was located.

New Plants Are Less Than Average Size

Average insulation board and hardboard plant capacity in January 1966 was little more than in 1956. In contrast with the trend in new particleboard plants, new insulation board and hardboard plants have been much smaller than mills operating in 1956. At that time the average insulation board plant could produce 92,000 tons per year, and the average hardboard plant 58,000 tons. New insulation board mills started in the last 10 years could make only 72,000 tons per year and the new hardboard mills only 35,000 tons.

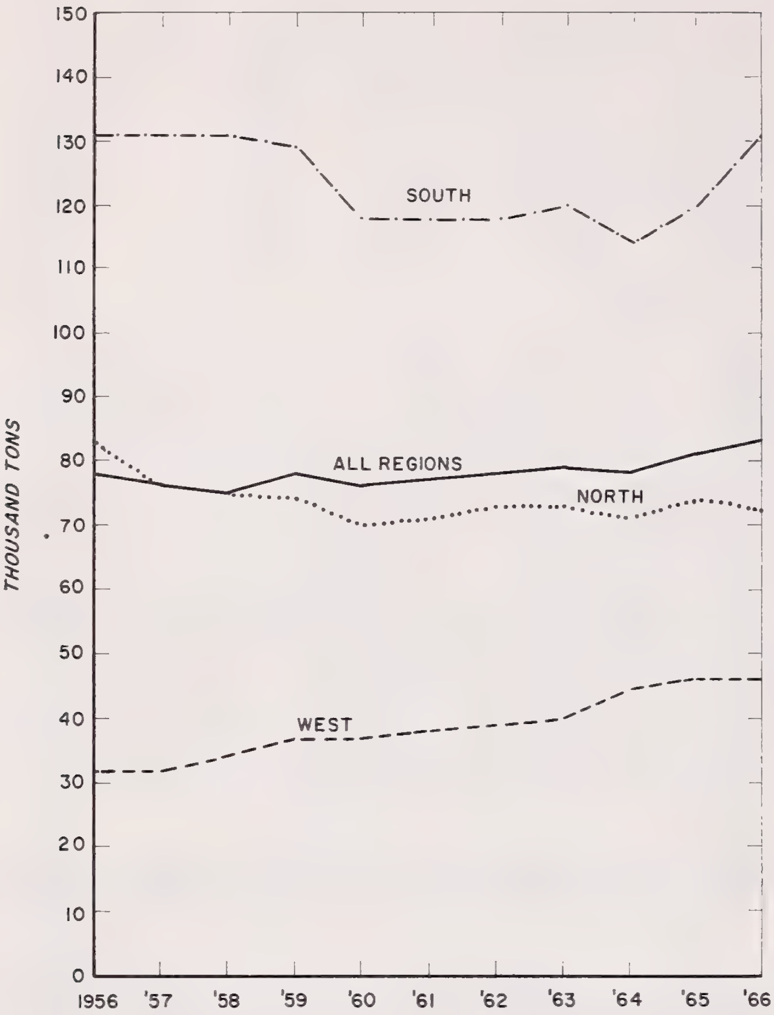


Figure 10.—Average annual insulation board and hardboard plant capacity January 1, by region, 1956–66.

Large regional differences in average plant size in both industries have persisted (fig. 10). In 1966, the average size of plants was 130,700 tons per year in the South, 71,600 tons in the North, and 46,300 tons in the West.

Production of Insulation Board and Hardboard Rises During Period

Output of products classified by producers as hardboard has risen from 1.5 billion square feet (1/8-inch basis) in 1956 to an expected 3 billion square feet in 1966 (table 5). The average annual rate of increase has been 7.2 percent. Insulation board output has not risen as rapidly as hardboard. The increase from 3 billion feet in 1956 to an expected 3.5 billion feet in 1966 was at an annual rate of 1.6 percent a year.

Taken together the production of insulation board and hardboard has increased from 1.6 million tons in 1956 to 2.3 million tons in 1965 (fig. 11). Slightly more was expected in 1966. The change in regional production from 1956 to 1964, the last year output by regions is available from Bureau of the Census publications, was:

	1956		*1964*	
	Production (thousand tons)	*Percent*	*Production (thousand tons)*	*Percent*
North	395	24	703	31
South	972	59	1, 146	51
West	275	17	414	18
United States	1, 642	100	2, 263	100

Imports of hardboard make up a substantial part of U.S. consumption. In 1965, hardboard imports were 215,000 tons, or about 21 percent of domestic production. Import volume, primarily from Sweden, Finland, and Canada, has tripled since 1956 and has had considerable impact on domestic marketing patterns. Insulation board imports were only 23,000 tons, less than 2 percent of production in 1965.

Capacity Utilization up Since 1960

From 1956 to 1960 the proportion of combined hardboard and insulation board capacity used de-

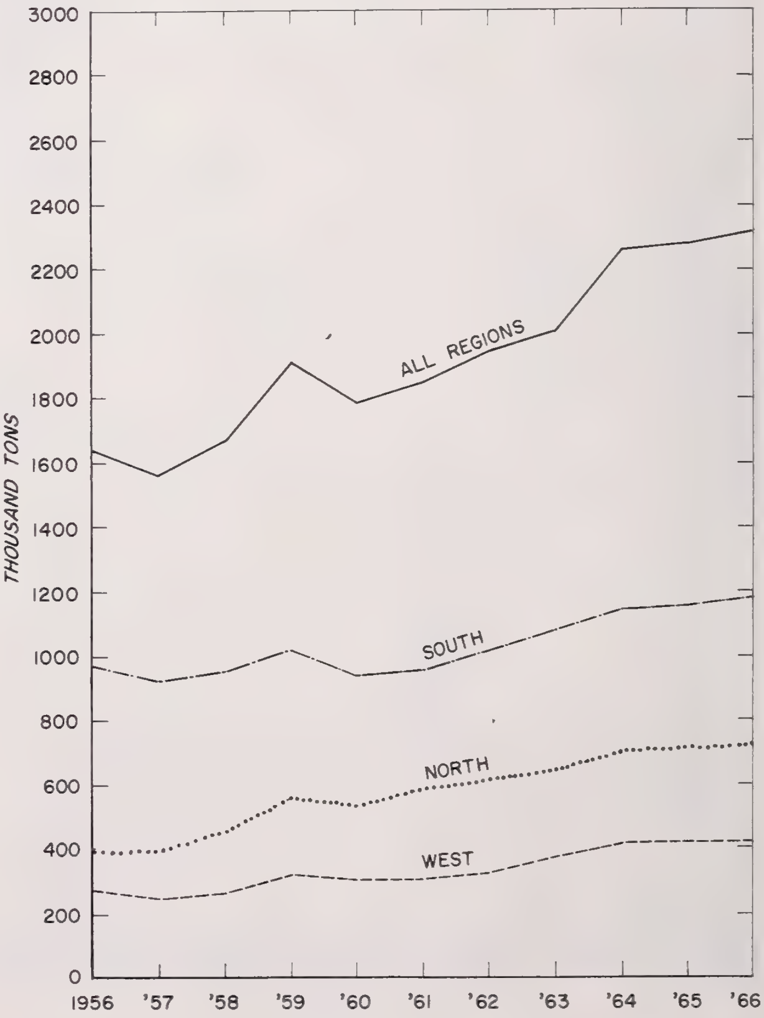


Figure 11.—Total insulation board and hardboard production by region, 1956–66.

clined, but since then utilization of capacity has generally risen (fig. 12). Although there are differences in utilization among regions, this general trend was apparent in all.

Trends in utilization of wood-base insulation board and hardboard capacity are similar to that of all fiberboard combined. The trends cannot be accurately determined because over one-fourth of total fiberboard capacity is in plants that make both products.

During most years, combined insulation board and hardboard capacity utilization has been higher than particleboard capacity utilization. Unlike some particleboard plants, insulation board and hardboard mills are often operated continuously.

Wood Use in Insulation Board and Hardboard Increased 4.8 Percent per Year

Between 1956 and 1964 the estimated amount of wood raw materials consumed in hardboard and insulation board increased from an equivalent of 106 million cubic feet per year to 154 million cubic feet. This amounted to 4.8 percent per year. Most of the increase has come from requirements of new plants, almost all of which use some form of wood. The percentage of raw material from bagasse has dropped from 9 percent to 6 percent. Some of the material has come from other nonwood fibers, but consumption of such fibers has declined from 3.4 percent to 2.6 percent. This is in part attributable to the cost and space required for storing raw material from seasonal harvests.

The estimated cubic-foot volume of raw material used by region in 1964 was:

[Million cubic feet]

	Softwood residues	*Hardwood residues*	*Softwood roundwood*	*Hardwood roundwood*	*Total*
North	----	1.9	11.2	31.8	44.9
South	17.4	17.6	19.8	18.5	73.3
West	32.7	1.2	1.2	1.2	36.3
United States	50.1	20.7	32.2	51.5	154.5

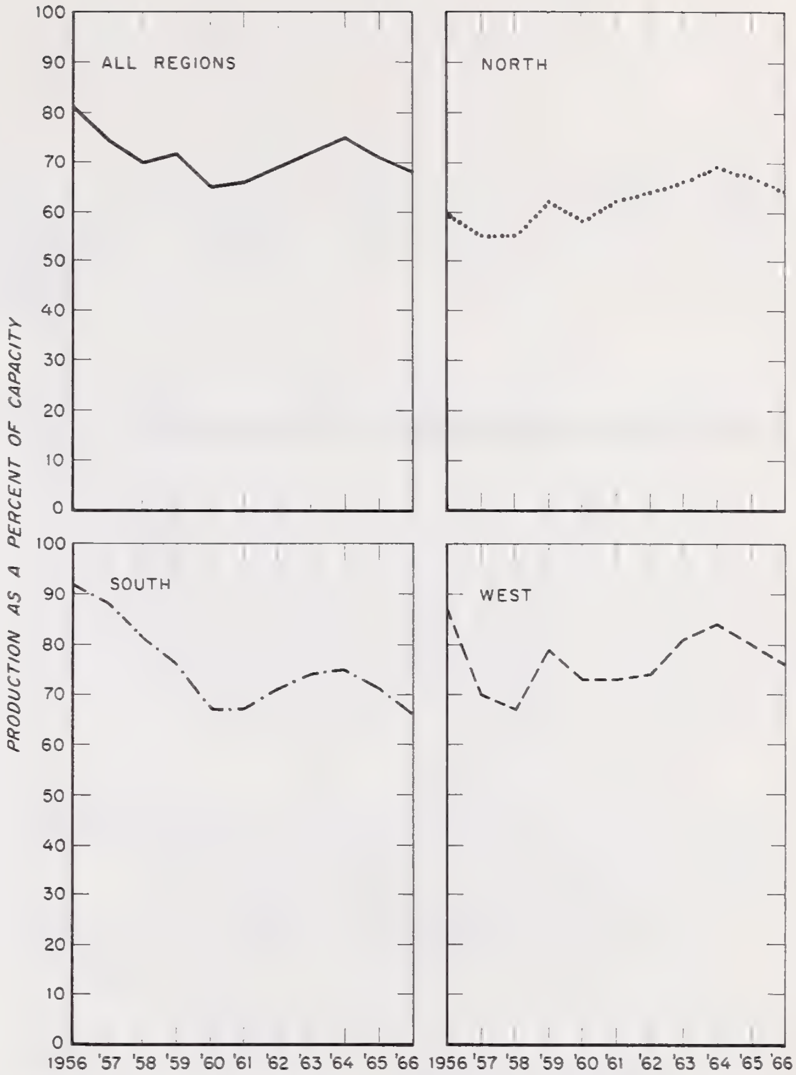


Figure 12.—Combined utilization of capacity in the insulation board and hardboard industries, by region, 1956–66.

About 46 percent of the wood raw material comes from fine and coarse residues from sawmills and plywood mills. Over two-thirds of these residues are softwood. In the West, sawmill, plywood, and other forest industry byproducts are used nearly exclusively, but they make up just 48 percent of raw material in the South, and only 4 percent in the North.

APPENDIX

Particleboard Raw Material Requirement Factors

The average volume of solid wood (either roundwood or residue) required to produce 1,000 square feet of particleboard is 80.1 cubic feet for all raw materials except northern hardwood roundwood. This factor is based on the following results from a survey of a sample of manufacturers.

1. Two-thirds of the average trimming waste of 9 percent is reused.
2. Half of the average sanding waste of 11 percent is reused.
3. Loss of material as fines is 2 percent.
4. Average particleboard density is 43 pounds per cubic foot with about 8 percent moisture content.
5. Content of resin and other additives averages 7 percent by weight.

The average weight of species used as raw material is about 35 pounds per cubic foot at 8 percent moisture content. Since much of the northern hardwood roundwood is lightweight aspen, the conversion factor for this source is 114.4 cubic feet per 1,000 square feet.

Insulation Board and Hardboard Raw Material Requirement Factors

The average volume of pulpwood required to produce 1 ton of insulation board or hardboard is 76.6 cubic feet. This factor was determined from the consumption of fibrous pulps consumed in making insulation board or hardboard and the amount of pulpwood required to yield these pulps.

As reported in the 1963 Census of Manufacturers, the consumption of fibrous materials per ton of building board produced was:

	Tons
Groundwood wood pulp	0.25
Semichemical wood pulp	.12
Other wood pulp (mostly defibrated and exploded)	.48
Total wood pulp	.85
Waste paper [2]	.05
Other	.13
Total fibrous materials	1.03

The pulpwood consumed in making 1 ton of the following wood pulps in 1964 was:

	Cubic feet
Groundwood wood pulp	79.8
Semichemical wood pulp	83.0
Defibrated and exploded wood pulp	75.0

On the basis of the types of pulp used in plants in each region, the U.S. average of 76.6 cubic feet per ton of insulation board or hardboard was adjusted to 75.1 cubic feet per ton in the North, 73.6 cubic feet in the South, and 87.6 cubic feet in the West.

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[2] Used only in the production of insulation board.

TABLE 1.—*Number of particleboard plants in the United States, by region, 1956–66*

Year	All regions			North			South			West		
	Total number (Jan. 1)	Plants starting production	Plants ceasing production	Total number (Jan. 1)	Plants starting production	Plants ceasing production	Total number (Jan. 1)	Plants starting production	Plants ceasing production	Total number (Jan. 1)	Plants starting production	Plants ceasing production
1956	25	11	0	6	2	0	12	7	0	7	2	0
1957	36	11	4	8	1	1	19	5	1	9	5	2
1958	43	7	1	8	2	0	23	3	1	12	2	0
1959	49	2	0	10	0	0	25	1	0	14	1	0
1960	51	5	3	10	1	1	26	2	0	15	2	2
1961	53	2	2	10	1	1	28	0	1	15	1	0
1962	53	1	3	10	0	1	27	0	2	16	1	0
1963	51	0	1	9	0	0	25	0	0	17	0	1
1964	50	3	1	9	1	1	25	1	0	16	1	0
1965	52	7	1	9	2	0	26	1	1	17	4	0
1966	58	n.a.[1]	n.a.[1]	11	n.a.[1]	n.a.[1]	26	n.a.[1]	n.a.[1]	21	n.a.[1]	n.a.[1]

[1] Not available.

Sources: Reid, William H., "This Particle Board Industry," reprinted from *The Lumberman*, July 1958; U.S. Department of Agriculture, Forest Service; U.S. Department of Commerce, Bureau of the Census; annual editions of the *Directory of the Forest Products Industry;* National Particleboard Association; and trade magazines.

TABLE 2.—*Particleboard industry capacity, production, and capacity utilization, by region, 1956–66*

[Million square feet, ¾-inch basis]

Year	Industry capacity (Jan. 1)	Capacity gains and losses during year					Average capacity for year	Production for year	Production as a percent of capacity
		Total	Gains in capacity			Losses in capacity			
			Total	New plants	Existing plants				
				ALL REGIONS					
1956	164	85	85	84	1	----------	206	*111	*54
1957	249	93	98	96	2	5	295	187	63
1958	342	110	112	96	16	2	397	*250	*63
1959	452	55	55	38	17	----------	479	298	62
1960	507	99	121	96	25	22	557	268	48
1961	606	62	65	41	24	3	637	326	51
1962	668	33	70	22	48	37	684	407	60
1963	701	34	42	--------	42	8	718	496	69
1964	735	182	194	124	70	12	826	638	77
1965	917	266	290	268	22	24	1, 050	*766	*73
1966	1, 183	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	*1, 217	*950	*78

See footnotes at end of table.

TABLE 2.—*Particleboard industry capacity, production, and capacity utilization, by region, 1956–66*—Con.

[Million square feet, ¾-inch basis]

Year	Industry capacity (Jan. 1)	Capacity gains and losses during year					Average capacity for year	Production for year	Production as a percent of capacity
		Total	Gains in capacity			Losses in capacity			
			Total	New plants	Existing plants				
NORTH									
1956	19	5	5	4	1	---	22	*12	*55
1957	24	2	3	3	---	1	25	16	64
1958	26	33	33	33	---	---	43	*28	*65
1959	59	1	1	---	1	---	60	37	62
1960	60	16	20	12	8	4	68	38	56
1961	76	24	25	23	2	1	88	38	43
1962	100	−3	---	---	---	3	98	28	29
1963	97	1	1	---	1	---	97	34	35
1964	98	5	17	14	3	12	101	45	45
1965	103	65	65	65	---	---	136	*60	*44
1966	168	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	*168	*84	*50
SOUTH									
1956	75	54	54	54	---	---	102	*33	*32
1957	129	28	31	30	1	3	143	69	48
1958	157	53	54	53	1	1	184	*91	*49
1959	210	13	13	8	5	---	217	110	51
1960	223	58	58	56	2	---	252	103	41
1961	281	9	11	---	11	2	285	124	44
1962	290	−29	5	---	5	34	276	166	60
1963	261	5	5	---	5	---	264	199	75
1964	266	18	18	10	8	---	275	236	86
1965	284	42	66	60	6	24	305	*263	*86
1966	326	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	*331	*294	*89
WEST									
1956	70	26	26	26	---	---	83	*66	*80
1957	96	63	64	63	1	1	127	102	80
1958	159	24	24	9	15	---	171	*131	*77
1959	183	41	41	30	11	---	203	151	74
1960	224	25	43	28	15	18	236	127	54
1961	249	29	29	18	11	---	264	165	62
1962	278	65	65	22	43	---	310	213	69
1963	343	28	36	---	36	8	357	264	74
1964	371	159	159	100	59	---	450	357	79
1965	530	159	159	143	16	---	609	*443	*73
1966	689	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	n.a.[1]	*718	*572	*80

[1] Not available.

*Estimated.

Sources: Reid, William H., "This Particle Board Industry," reprinted from *The Lumberman*, July 1958; U.S. Department of Agriculture, Forest Service; U.S. Department of Commerce, Bureau of the Census; annual editions of the *Directory of the Forest Products Industry;* National Particleboard Association; and trade magazines.

TABLE 3.—*Number of insulation board and hardboard plants, by primary product and region, Jan. 1, 1956–66*

Year	All regions			North			South			West		
	All plants	Hardboard plants	Insulation board plants	All plants	Hardboard plants	Insulation board plants	All plants	Hardboard plants	Insulation board plants	All plants	Hardboard plants	Insulation board plants
1956	26	11	15	8	1	7	8	2	6	10	8	2
1957	27	12	15	9	2	7	8	2	6	10	8	2
1958	29	14	15	10	3	7	8	2	6	11	9	2
1959	33	14	19	12	3	9	10	2	8	11	9	2
1960	36	16	20	13	4	9	12	3	9	11	9	2
1961	36	16	20	13	4	9	12	3	9	11	9	2
1962	36	16	20	13	4	9	12	3	9	11	9	2
1963	36	16	20	13	4	9	12	3	9	11	9	2
1964	38	17	21	14	4	10	13	4	9	11	9	2
1965	38	17	21	14	4	10	13	4	9	11	9	2
1966	40	19	21	15	5	10	13	4	9	12	10	2

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of Commerce, Bureau of the Census; annual editions of the *Directory of the Forest Products Industry;* annual editions of *Lockwood's Directory of the Paper and Allied Trades;* Insulation Board Institute; American Hardboard Association; and trade magazines.

TABLE 4.—*Combined hardboard and insulation board capacity, production, and capacity utilization, by region, 1956–66*

[Thousand tons]

Year	Capacity (Jan. 1)	Increase in capacity during year			Average capacity for year	Production for year	Production as a percent of capacity
		Total	New plants	Existing plants			
ALL REGIONS							
1956	2, 030	16	16	----------	2, 038	1, 642	81
1957	2, 046	135	135	----------	2, 114	1, 558	74
1958	2, 181	405	381	24	2, 383	1, 666	70
1959	2, 586	149	81	68	2, 661	1, 905	72
1960	2, 735	24	----------	24	2, 747	1, 784	65
1961	2, 759	46	----------	46	2, 782	1, 846	66
1962	2, 805	36	----------	36	2, 823	1, 945	69
1963	2, 841	119	30	89	2, 901	2, 098	72
1964	2, 960	135	----------	135	3, 028	2, 263	75
1965	3, 095	233	67	166	3, 211	*2, 280	*71
1966	3, 328	n.a.[1]	n.a.[1]	n.a.[1]	*3, 449	*2, 320	*68

See footnotes at end of table.

TABLE 4.—*Combined hardboard and insulation board capacity, production, and capacity utilization, by region, 1956–66*—Continued

[Thousand tons]

Year	Capacity (Jan. 1)	Increase in capacity during year			Average capacity for year	Production for year	Production as a percent of capacity
		Total	New plants	Existing plants			
NORTH							
1956	664	16	16	---	672	395	59
1957	680	71	71	---	716	391	55
1958	751	138	138	---	820	452	55
1959	889	18	15	3	899	555	62
1960	907	12	---	12	913	534	58
1961	919	36	---	36	937	581	62
1962	955	---	---	---	955	611	64
1963	955	41	17	24	975	641	66
1964	996	36	---	36	1,014	703	69
1965	1,032	42	42	---	1,053	*710	*67
1966	1,074	n.a.[1]	n.a.[1]	n.a.[1]	*1,118	*720	*64
SOUTH							
1956	1,051	---	---	---	1,051	972	92
1957	1,051	---	---	---	1,051	924	88
1958	1,051	243	243	---	1,172	953	81
1959	1,294	122	66	56	1,355	1,027	76
1960	1,416	6	---	6	1,419	948	67
1961	1,422	---	---	---	1,422	954	67
1962	1,422	20	---	20	1,432	1,013	71
1963	1,442	38	13	25	1,461	1,082	74
1964	1,480	82	---	82	1,521	1,146	75
1965	1,562	137	---	137	1,630	*1,150	*71
1966	1,699	n.a.[1]	n.a.[1]	n.a.[1]	*1,776	*1,180	*66
WEST							
1956	315	---	---	---	315	275	87
1957	315	64	64	---	347	243	70
1958	379	24	---	24	391	261	67
1959	403	9	---	9	407	323	79
1960	412	6	---	6	415	302	73
1961	418	10	---	10	423	307	73
1962	428	16	---	16	436	321	74
1963	444	40	---	40	465	375	81
1964	484	17	---	17	493	414	84
1965	501	54	25	29	528	*420	*80
1966	555	n.a.[1]	n.a.[1]	n.a.[1]	*555	*420	*76

[1] Not available.

*Estimated.

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of Commerce, Bureau of the Census; annual editions of the *Directory of the Forest Products Industry;* annual editions of *Lockwood's Directory of the Paper and Allied Trades;* Insulation Board Institute; American Hardboard Association; and trade magazines.

TABLE 5.—*Hardboard and insulation board production, 1956–66*

[Thousand units]

Year	Combined production (tons)	Hardboard production		Insulation board production	
		Square feet, ⅛-inch basis	Tons	Square feet, ½-inch basis	Tons
1956	1, 642	1, 496, 778	540	2, 972, 593	1, 102
1957	1, 558	1, 555, 888	569	2, 679, 434	989
1958	1, 666	1, 693, 308	609	2, 883, 659	1, 057
1959	1, 905	2, 021, 448	734	3, 114, 036	1, 171
1960	1, 784	1, 930, 434	686	2, 848, 315	1, 098
1961	1, 846	2, 154, 168	762	2, 849, 606	1, 084
1962	1, 945	2, 510, 341	865	2, 885, 394	1, 080
1963	2, 098	2, 709, 476	959	3, 039, 117	1, 139
1964	2, 263	2, 856, 003	1, 048	3, 265, 800	1, 215
1965	*2, 280	*2, 921, 498	*1, 010	*3, 453, 466	*1, 270
1966	*2, 320	*2, 970, 000	*1, 030	*3, 516, 000	*1, 290

* Estimated.

Source: U.S. Department of Commerce, Bureau of the Census.

TABLE 6.—*Particleboard plants in the United States, by location, capacity, and raw material used, January 1966*

Plant No.[1]	Plant name [2] (by Region and State)	Plant location	Annual capacity in million square feet	Raw material used
	NORTH			
	Illinois:			
1	Rock Island Millwork	Rock Island	5. 0	Softwood, residues.
	Indiana:			
2	Swain Industries, Inc	Seymour	6. 6	Hardwood, residues.
	Kentucky:			
3	Jasper-American Manufacturing Co., The.	Henderson	10. 5	Softwood, residues.
	Michigan:			
4	U.S. Plywood Corp	Gaylord	50. 0	Softwood, roundwood, Hardwood, roundwood.
	New York:			
5	Flakeboard Corp	Jamestown	23. 0	Hardwood, roundwood.
	Pennsylvania:			
6	Viko Furniture Corp	Eldred	2. 5	Hardwood, residues.
7	West Virginia Pulp & Paper Co	Tyrone	20. 0	Hardwood, roundwood.
8	Woodcore, Inc	Scottdale	3. 5	Hardwood, residues.
	West Virginia:			
9	West Virginia Forest Products Co	Beckley	14. 0	Hardwood, roundwood.
	Wisconsin:			
10	Rock Island Millwork Co	Marinette	15. 0	Softwood, residues.
11	Wynnewood Products Co	Antigo	18. 0	Hardwood, roundwood.

See footnotes at end of table.

Table 6.—*Particleboard plants in the United States, by location, capacity, and raw material used, January 1966*—Continued

Plant No.[1]	Plant name [2] (by Region and State)	Plant location	Annual capacity in million square feet	Raw material used
	SOUTH			
	Arkansas:			
12	Georgia-Pacific Crossett	Crossett	36. 0	Do.
13	Singer Co., The	Truman	6. 0	Do.
14	Southern Plaswood Corp	Hope	12. 0	Softwood, residues.
	Mississippi:			
15	Kroehler Manufacturing Co	Meridian	7. 2	Hardwood, residues.
16	MPI Industries, Inc	Jackson	2. 4	Do.
	North Carolina:			
17	American Furniture Co	North Wilkesboro	5. 0	Do.
18	American Paperboard, Division of American Liberty Oil Co.	Black Mountain	12. 0	Softwood, residues.
19	Broyhill Furniture Factories	Lenoir	5. 0	Hardwood, residues.
20	Do	Newton	5. 0	Do.
21	Caldwell Furniture Co	Lenoir	4. 5	Do.
22	Carolina Forest Products, Inc	Wilmington	10. 0	Softwood, residues.
23	Dixie Chipboard Co	Rural Hall	10. 0	Softwood, residues. Hardwood, residues.
24	Formica Corp	Farmville	40. 0	Softwood, roundwood, residues.
25	Georgia Pacific Corp	Hallsboro	3. 8	Hardwood, residues.
26	Hickory Manufacturing Co	Hickory	2. 3	Do.
27	NuWoods, Inc., Cavalier Division	Lenoir	6. 0	Do.
28	Thomason Chipboard Co	Fayetteville	4. 0	Softwood, residues.
	South Carolina:			
29	Williams Furniture Co	Sumter	10. 0	Hardwood, residues.
	Tennessee:			
30	Berkline Corp., The	Morristown	1. 5	Do.
31	Tenn-Flake Corp	do	10. 0	Softwood, roundwood, Hardwood, roundwood.
	Texas:			
32	Temple Industries, Inc	Pineland	10. 0	Softwood, residues.
33	Wynnewood Products Co	Jacksonville	12. 0	Hardwood, do.
	Virginia:			
34	American Furniture Co., Inc	Martinsville	10. 0	Hardwood, residues.
35	Gray Products Co., Inc	Waverly	60. 0	Softwood, residues.
36	Lane Co., The	Alta Vista	12. 0	Hardwood, residues.
37	U.S. Plywood Corp	South Boston	30. 0	Softwood, roundwood.
	WEST			
	California:			
38	Big Bear Board Products, Inc	Redlands	26. 0	Softwood, residues.
39	Collins Pine Co	Chester	24. 0	Do.
40	Hambro Forest Products, Inc	Crescent City	12. 0	Do.
41	Humbolt Flakeboard Corp	Arcata	45. 0	Do.
42	U.S. Plywood Corp	Anderson	65. 0	Do.
	Idaho:			
43	Pack River Co., The (Tenex Inc.)	Dover	22. 0	Do.
	Oregon:			
44	Brownsville Particle Board, Inc	Brownsville	30. 0	Do.
45	Cascade Fiber Co	Eugene	33. 0	Do.
46	Clad-wood	Sweet Home	3. 0	Do.
47	Clear Fir Products of Oregon, Ltd	Springfield	3. 3	Do.
48	Douglas Veneer Co	Dillard	100. 0	Do.
49	Duraflake Co	Albany	90. 0	Do.
50	Forest Industries, Inc	Dillard	25. 0	Do.
51	Do	White City	63. 0	Do.
52	Lester Cedar Products, Inc	Sweet Home	7. 0	Softwood, residues, Hardwood, residues.

See footnotes at end of table.

TABLE 6.—*Particleboard plants in the United States, by location, capacity, and raw material used, January 1966*—Continued

Plant No.[1]	Plant name [2] (by Region and State)	Plant location	Annual capacity in million square feet	Raw material used
	Oregon—Continued			
53	Pope & Talbot, Inc	Oakridge	24.0	Softwood, residues.
54	Standard Board Products, Inc	Sweet Home	12.0	Do.
55	Timber Products Co., Division of Cyprus Mines Corp.	Medford	40.0	Do.
56	Weyerhaeuser Co	North Bend	30.0	Do.
57	Do	Springfield	27.5	Do.
	Washington:			
58	Long-Bell Lumber, Division of International Paper Co.	Longview	6.6	Do.

[1] Plant numbers correspond to those on map, p. 2.
[2] Firm names are used as subject matter and do not represent endorsements by the Forest Service, USDA.

TABLE 7.—*Insulation board and hardboard plants in the United States, by location, primary product, capacity, and raw material used, January 1966*

Plant No.[1]	Plant name[2] (by Region and State)	Plant location	Primary product	Capacity in tons per day	Raw material used
	NORTH				
	Iowa:				
1	Allied Chemical & Dye Corp., Barrett Division.	Dubuque	Insulation board	160	Hardwood, roundwood.
	Maine:				
2	U.S. Gypsum	Lisbon Falls	do	142	Softwood, roundwood.
	Michigan:				
3	Abitibi Corp	Alpena	Hardboard	282	Hardwood, roundwood.
4	Celotex Corp	L'Anse	Insulation board	270	Do.
	Minnesota:				
5	Boise-Cascade Corp., Insulite Division.	International Falls.	do	750	Do.
6	Nu Ply Corp	Bemidji	Hardboard	72	Do.
7	Superwood Corp	Duluth	do	233	Hardwood, roundwood. Softwood, roundwood.
8	Wood Conversion Co	Cloquet	Insulation board	360	Hardwood, roundwood.
	Missouri:				
9	Huebert Fiberboard, Inc	Boonville	do	50	Do.
	New Jersey:				
10	Homasote Co	Trenton	do	300	Used newsprint.
	New York:				
11	Upson Co., The	Lockport	do	133	Softwood, roundwood.
	Pennsylvania:				
12	Allied Chemical & Dye Corp., Barrett Division.	Sunbury	do	240	Hardwood, roundwood.
	Rhode Island:				
13	Bird & Son	Phillipsdale	do	80	Softwood, roundwood.
	Wisconsin:				
14	Superior Fiber Products, Inc.	Superior	Hardboard	128	Hardwood, roundwood.
15	Wisconsin Wood Products, Inc.	Phillips	do	55	Hardwood, residues.

See footnotes at end of table.

TABLE 7.—*Insulation board and hardboard plants in the United States, by location, primary product, capacity, and raw material used, January 1966*—Continued

Plant No.[1]	Plant name[2] (by Region and State)	Plant location	Primary product	Capacity in tons per day	Raw material used
	SOUTH				
	Alabama:				
16	National Gypsum Co	Mobile	Insulation board	375	Hardwood, roundwood. Softwood, roundwood.
	Arkansas:				
17	Superwood Corp. of Duluth.	Little Rock	Hardboard	50	Hardwood, roundwood.
	Georgia:				
18	Armstrong Cork Co	Macon	Insulation board	750	Hardwood, roundwood. Softwood, roundwood.
	Louisiana:				
19	Celotex Corp	Marrero	do	600	Bagasse.
	Mississippi:				
20	Flintkote Co., The	Meridian	do	225	Softwood, roundwood.
21	Johns-Manville Corp	Natchez	do	360	Mineral base.[3]
22	Masonite Corp	Laurel	Hardboard	1285	Hardwood, roundwood.
23	U.S. Gypsum Co	Greenville	Insulation board	295	Do.
	North Carolina:				
24	Georgia-Pacific Corp	Conway	Hardboard	214	Hardwood, residues.
	Oklahoma:				
25	Dierks Forests, Inc	Broken Bow	Insulation board	454	Softwood, residues.
	South Carolina:				
26	U.S. Plywood Corp	Catawba	Hardboard	193	Hardwood, roundwood.
	Virginia:				
27	Johns-Manville Corp	Jarratt	Insulation board	(4)	Softwood, roundwood.
	Texas:				
28	Temple Industries, Inc., Fiber Products Div.	Diboll	do	146	Hardwood, residues. Softwood, residues.
	WEST				
	California:				
29	Masonite Corp	Ukiah	Hardboard	332	Softwood, residues.
	Oregon:				
30	Evans Products Co	Corvallis	do	76	Do.
31	Forest Fiber Products Co	Forest Grove	do	100	Do.
32	Georgia-Pacific Corp	Coos Bay	do	154	Do.
33	Hines Lumber Co., Edward.	Dee	do	100	Do.
34	Kaiser Gypsum Co., Insulating Board Division.	St. Helens	Insulation board	180	Do.
35	Pope & Talbot, Inc	Oakridge	Hardboard	75	Do.
36	U.S. Gypsum Co	Pilot Rock	do	193	Do.
37	U.S. Plywood Corp	Lebanon	do	150	Do.
38	Weyerhaeuser Timber Co	Klamath Falls	do	128	Do.
	Washington:				
39	Anacortes Veneer, Inc	Anacortes	do	56	Do.
40	Simpson Timber Co	Shelton	Insulation board	138	Do.

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[1] Plant numbers correspond to those on map, p. 8.

[2] Firm names are used as subject matter and do not represent endorsements by the Forest Service, USDA.

[3] In prior years wood fiber was used in addition to mineral raw material.

[4] Capacity unknown.

TABLE 8.—*New and proposed particleboard, insulation board, and hardboard plants*

Plant name[1] (by Region and State)	Plant location	Primary product
NORTH		
Indiana:		
Storrs Wood Products Co.	Tell City	Particleboard.
Kentucky:		
General Refractories (Grefco) Inc.	Florence	Insulation board.
Tenn-Flake Corp	Middlesboro	Particleboard.
Michigan:		
Northboard, Inc	Caspian	Do.
Minnesota:		
Woodland Board Products, Inc.	Crosby	Do.
Pennsylvania:		
Masonite Corp	Towanda	Hardboard.
New York:		
Allied Chemical Co., Barrett Division.	Deposit	Do.
Wisconsin:		
Weyerhaeuser Co	Marshfield	Particleboard.
SOUTH		
Arkansas:		
International Paper Co., Long-Bell Division.	Malvern	Particleboard.
Potlatch Forests, Inc	Warren	Do.
SOUTH—continued		
Florida:		
Coastal Timber Land and Pulp.	Blountstown	Hardboard.
Georgia:		
Langdale Co., The	Valdosta	Particleboard.
Weyerhaeuser Co	Adel	Do.
Mississippi:		
Georgia-Pacific Corp	Louisville	Do.
U.S. Plywood Corp	Oxford	Do.
Tennessee:		
Dynatex	Sunbright	Do.
Texas:		
Evans Products Co	Silsbee	Do.
Virginia:		
Evans Products Co	Chesapeake	Hardboard.
WEST		
California:		
Forest Fiber Products Co.	Crescent City	Do.
Oregon:		
Boise Cascade Corp	La Grande	Particleboard.
Brooks-Willamette Corp.	Bend	Do.
U.S. Plywood Corp	Roseburg	Do.

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[1] Firm names are used as subject matter and do not represent endorsements by the Forest Service, USDA.

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